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AUTHOR Grubb, W. Norton
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ABSTRACT

This analysis assesses alternative explanations of the robust enrollment growth in community colleges in the 1970's, part of a larger trend of increased vocationalization of education. The conventional explanation is that community colleges offer the most appropriate training for rapidly increasing jobs requiring middle-level skills. Various other models attempting to account for the enrollment growth in two-year institutions are considered; common to several models are: the presumption of expanded job opportunities in middle-level occupations, a concern with the supply of students, who may respond primarily to economic factors such as earnings or training costs, or to other factors including the entrepreneurial efforts of administrators or the ideological appeal of vocationalism; and a lack of information on the actual benefits of vocationally oriented community colleges. The growth rates of enrollments and degrees awarded in community college vocational programs are compared with the growth rates of specific occupations, revealing that increases in middle-level jobs are insufficient to explain enrollment increases; a pluralistic approach employing a combination of explanations is thus recommended. Focal points for further examination of the problem are discussed. (Author/MJL)

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May 1983

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W. Norton Grubb

May 1983

W. Norton Grubb is a professor at the Lyndon B. Johnson School of Public Affairs, University of Texas, Austin.

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Abstract

During the past two decades, the community college has grown faster than other levels of higher education and has become an increasingly vocational institution. These changes are part of the larger process of vocationalization that has affected almost every level of schooling at different times. The paper first outlines several possible theories that might explain expanding community college enrollments. Then it examines data on the growth rates of community college degrees and enrollments in specific occupational programs compared to the growth rates of employment in the relevant occupations; the data suggest that a "pluralist" approach, considering a variety of explanations, is necessary to explain the changes in community colleges. The paper concludes with several suggestions for further research.

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The community college has been one of the few robust educational institutions over the past decade. While the rest of higher education has been relatively stagnant, enrollment growth in the community college continues to be strong. Although elementary and secondary education has faced taxpayer revolts and four-year institutions have faced both revenue reductions and closures, the financial position of the community colleges appears to be relatively more secure. Both four-year institutions and elementary and secondary education have suffered the losses of federal funds under President Reagan, but the community colleges -- which receive relatively little federal funds -- have been hurt less. With the increasing popularity of the view that the American labor force is "over-educated," the community college seems to be in an ideal position to prepare a well-trained labor force while avoiding the problem of preparing students for a dwindling number of jobs that require a college education.

Between 1970 and 1979, enrollments in two-year institutions grew by 90%, while enrollments in four-year institutions grew by 12%. Since the population aged 18 to 24 grew by only 19% in this period, community college enrollments cannot be explained simply by the "baby boom." (Even during the 1960s, an expansionary period for four-year colleges, community college enrollments increased by 261% while four-year college enrollment increased by about 89%.) Preliminary figures show an enrollment increase of 3.5% in 1981, with a similar increase expected for the fall of 1982 -- with other enrollments in higher education approximately constant.[1] Because of differential growth rates, two-year colleges accounted for 37% of higher education enrollments in 1979 (with 52% of enrollments in four-year institutions), compared to 26% in 1970 and 13% in 1960.[2] Another way to describe the growth of the community colleges is by the number of degrees granted: between 1969-70 and 1977-78, the number of Associate of Arts (A.A.) degrees and other formal awards below the B.A. level increased by 124%, while the growth rate of B.A. degrees was 20% and the 18-24 age group grew by only 17%.

As the community college has expanded, its central purpose has changed. As recently as 1960 the community college was a predominantly academic institution, with the goal of transferring to a four-year college foremost for most students. During the 1960s and 1970s, a furious debate developed between the proponents of an academic mission, stressing the role of two-year colleges in providing access to four-year institutions, and those emphasizing vocational goals and the community college as a terminal institution.[3] During the 1970s two-year institutions grew increasingly vocational in their curricula, prodded by various commissions and reports from groups outside the community colleges eager to increase middle-level skill training and to reduce "over-education" at the B.A. level.

Currently, there is substantial agreement that two-year institutions have become predominantly vocational rather than academic, although the data to substantiate this trend remains elusive. Between 1965 and 1976 the proportion of two-year college students in vocational programs increased from 13% to 50%;[4] in 1978-79, when total community college enrollments were 4,064,382, vocational enrollments in A.A. programs were 1,949,558 and enrollments in long-term adult programs -- largely technical institutes -- were 969,560, suggesting that as much as 72% of enrollments were vocational.[5] At the same time, another 3,805,071 students were in "adult" vocational courses shorter than six months -- many of these in non-degree programs within the community colleges. The shift toward vocational goals has also influenced degree recipients: In 1970-71, 50% of all A.A. degrees and other awards below the B.A. level were in occupational curricula (rather than arts and sciences and other general programs); by 1977-78 this fraction had grown to 68%.[6]

In the process of becoming increasingly vocational, post-secondary vocational programs have begun to rival secondary vocational education. In 1979-80, 39% of all vocational education took place at the post-secondary level.[7] The importance of post-secondary vocational education, rather than the secondary programs that have always been the heart of vocational education, may be even greater than these numbers indicate,

since a great deal of secondary vocational enrollment is really avocational (like automobile courses, homemaking, and typing). In addition, there is now substantial evidence that the rate of return to secondary vocational education over alternative curricula is essentially zero, while the evidence on post-secondary vocational programs is at least mixed.[8] Thus post-secondary education is now the level where the most important developments in vocational education are taking place.

The expansion of two-year institutions has therefore substantially changed the composition of higher education and of vocational education in a short period of time. Since most two-year institutions are funded predominantly through state and local funds rather than federal funds, this expansion has resulted from myriad decisions by students, local administrators, state legislators, and taxpayers, rather than by a federal initiative or some other centralized pressure. The central question, then, is what caused the booming enrollment in two-year institutions during the 1970s. Although there is a conventional explanation offered by community college administrators, alternative models may explain recent enrollment patterns more accurately. The differences among these possible explanations are important because of their normative and policy implications.

An earlier stage of American education provides a close parallel to the growth of community colleges during the 1970s. Between 1890 and 1920 high school enrollments grew rapidly; like the community college in the 1970s, the high school in the progressive period became (after considerable debate) increasingly vocational rather than academic -- both in the sense that an explicitly vocational curriculum developed and in the more general sense that educators increasingly felt that their students were in school in order to get jobs.[9] The developments in the community college are therefore part of the larger process, affecting many levels of the educational system, by which schooling has become increasingly vocational. Analyzing these developments should provide a better understanding of the general relations between schooling and labor markets.

Possible Explanations of Growing Post-Secondary Enrollment

Supporters of community college have offered a simple explanation for enrollment growth in post-secondary vocational education: jobs requiring middle-level skills have grown faster than other jobs, and the skills for these jobs are more appropriately learned in two-year colleges than in the high school or in four-year institutions.[10] These middle-level occupations include a large number of technicians, paraprofessionals, semi-professionals, foremen, and skilled clerical and craft workers. One description of these middle-level occupations includes the following characteristics:

> (1) They require training beyond the high school level. (2) They require some theoretical knowledge of mathematics and science equal to the first year or two of a professional program. (3) They require training in the development of manipulative skills for using delicate and precise laboratory instruments and equipment. (4) They often require that a person have personality characteristics which allow him to understand human behavior, especially if he is employed in a supervisory position or in a social-service or human-relations occupation. (5) They train students as assistants to professional workers or administrative officials.[11]

Often, the growth of such occupations has been explained by technological developments, with the expansion of computer-related jobs and health technologists common examples of new and expanding occupations generated by technical advances. In this conventional view, occupational demand due to technical change leads directly to increased enrollments, with the implication that community college students then find jobs in the areas for which they have been trained and thereby satisfy the increased demand.

While the conventional view is correct to some extent, it is incomplete in important ways and runs into several empirical problems. As I will show, enrollment increases have not always matched increases in jobs available, and the largest enrollment increases have come in traditional occupations rather than emerging, high-technology fields. The conventional view often assumes what needs to be demonstrated -- that community college enrollment does lead to better employment or higher earnings. The

reasons for increasing demand, which prove to be potentially complex, are generally given scant attention. Finally, other sources of pressure for enrollment increases, the appropriate division of costs and benefits between students, employers, and the public, and other issues of historic interest have been generally ignored. To raise these other issues it is appropriate to examine several theories that may explain in different ways -- and with varying degrees of detail -- why post-secondary vocational enrollments have increased so fast. In particular, a "pluralist" approach to explaining vocational trends in education is appropriate because the labor market itself is so fragmented, and therefore the skills required and the reasons why employers use education vary considerably among different occupations.[12]

The Human Capital View

From the viewpoint of human capital theory, a sustained increase in enrollment -- or an increase in the enrollment rate -- at any particular level of schooling might come from an exogenous increase in demand. This would then increase the earnings of graduates and therefore the rate of return to community college over high school, causing greater proportions of individuals to attend community college.[13] This view, compatible with the conventional wisdom about community college expansion, has one additional implication: that the rate of return to community colleges has risen, more or less permanently. Without such an increase enrollments cannot remain high, since if community college students fail to realize higher returns, enrollments will eventually fall.

However, the possible reasons for the expansion of demand for community college students remain unclear. The growth of demand could come from either of four distinct sources: from growth in occupations that have traditionally employed community college students; from the development of "new" occupations requiring middle-level skills, like some high-tech jobs; from a process of taking lower-skill positions and requiring greater skills, and therefore more education -- the model of skills upgrading; and from a process of taking occupations with higher skill re-

quirements and simplifying those jobs so that individuals with community college training can perform them -- the model of de-skilling.[14] These processes differ in some of their implications; for example, de-skilling has often been deplored for stripping jobs of their challenge and intrinsic interest, and one antidote commonly suggested has been skills upgrading. From the vantage of the community college, between the high school and four-year college, both skills upgrading from lower-level jobs and de-skilling of more professional occupations may result in increased demand.

In addition to the demand-side versions of the human capital model, a supply-side version may also explain enrollment increases. One component of the rate of return is the cost of schooling, both the direct costs and the opportunity costs of earnings foregone. If costs are exogenously reduced, then the supply of students and enrollments will increase.[15] This explanation also implies that the rate of return to community colleges increases, though the earnings differential may be constant or even fall. Although real decreases in tuition might be one explanation of reduced costs, a more likely reason is the increase in unemployment rates -- especially for younger workers -- that reduces the likelihood of employment and therefore the opportunity costs of college attendance. Finally, students may be more sensitive to costs than to earnings differences because earnings are relatively uncertain. The implication that opportunity costs rather than earnings differentials dominate schooling decisions implies that occupational patterns -- and the resulting changes in relative wages -- may have relatively little influence on community college enrollment. In fact, if the opportunity costs of attending community colleges are reduced enough, attendance may become rational even when earnings differentials associated with community college attendance are quite low, so that it may be possible to see increasing enrollments even though community college confers no appreciable economic advantage.

The pattern of community college enrollments during the 1970s suggests that the opportunity cost of community college has in fact played

a critical role. In the period of 1973-75, when unemployment rates were rising, community college enrollments also increased dramatically; they then remained relatively flat during a period of moderate expansion, and began to increase again in 1979, just as unemployment rates began increasing again. The notion that high unemployment drives individuals back to school -- and increasingly to community colleges -- is frequently mentioned by those commenting on enrollment patterns.[16] Although increases in enrollments because of decreasing opportunity costs are fully consistent with the human capital model, this supply-driven version is very different in spirit from the conventional demand-driven human capital model implicitly relying on exogenous technical changes.

Signaling Theories

A somewhat different model views education as a signal of ability, rather than a process that instills in individuals the cognitive skills or the personality traits that increase their marginal productivity.[17] The conception of education as a signal shares with human capital theory the assumption of perfectly competitive labor markets, so that workers are paid their marginal products and so that any deterioration in the signaling content of education -- any tendency for education and ability to become less highly correlated -- must lead to a reduced use of education as a criterion for hiring. Since community colleges are less selective than four-year institutions, but require some initiative and independence on the part of high school completers, community college attendance may be a good signal of ability, differentiating individuals of middling ability levels from those who attend four-year colleges and those who fail to enroll in any post-secondary education.

If the signaling model is accurate, then increasing community college enrollments could be explained either by increases in the demand for middle-level occupations for which community college attendance is an appropriate signal of ability, or by an increase in the signaling content of community college attendance. For example, since community college attendance in the early 1960s was comparatively rare, it may have been a

random event without any link to ability level; as two-year college enrollments have grown, then the information content may be correspondingly greater. Another way to state this hypothesis is that as long as any level of education is small, employers have no real idea what attendance means; as expansion takes place, the information content may become more obvious and allow employers to use that level of education as a signal.

If community college attendance has become an increasingly powerful signal, that process should be linked to increased enrollments, to the routinization and to the increasingly refined process of stratification among the different levels of higher education that tends to place students of different ability levels (or, alternatively, class and race) in different institutions. Therefore any increased use of community college attendance as a signal, and the greater enrollments that might follow, should depend partly on the changes internal to the community colleges during the past two decades.

However, community college attendance may be an ambiguous signal of ability. In a period of high unemployment, those high school completers who find or retain jobs are likely to be the more able, dynamic, and diligent, while those unable to find jobs -- who then return to school -- may be relatively incompetent and slothful. This selection mechanism implies that community college students may be less able than high school completers who don't continue their education;[18] if so, community college would lose its value as a signal. If that happens -- and it may happen to a greater extent in recessions than in periods of low unemployment -- then employers will cease using community college attendance as a signal of ability, the earnings advantage should fall, and enrollments should fall in response.

The Model of Job Competition

In the neo-classical theory of competitive labor markets, wage levels change to equilibrate supply and demand, and all workers are paid their marginal products. In the model of job competition developed by Lester

Thurow,[19] wages do not necessarily equal marginal products, and may be established by institutional and historical forces as well as supply and demand. For every job there is a queue of prospective applicants -- potentially a long queue, especially in an economy with high unemployment. Individuals in a queue are ranked according to ability, trainability, other job-related characteristics, and -- since there are typically more well-qualified applicants than positions available -- characteristics unrelated to job performance like race, sex, or appearance. One important difference from the human capital model is that increases in the demand for a particular occupation may not require increased wages, since employers can simply go further down in the queue to hire additional workers. Conversely, exogenous increases in the supply of workers in a particular occupation may not decrease wages but simply lengthen the queue of applicants and rearrange the order of individuals in the queue. Since the link between wages and marginal productivity is broken, increasing skill levels may not lead to higher wages, although they may lead to higher positions in various job queues.

If there is growth in jobs for which community college students are well-prepared -- that is, are relatively high in the queue of applicants -- then this should lead to increased enrollments as the human capital theory predicts, but without the wage increases required by human capital theory. As before, increasing demand may come from either growth in jobs previously requiring community college training, from de-skilling, or from skills upgrading. However, there is one additional possibility: if queues for some jobs become relatively longer -- because of higher unemployment, for example -- then some students may gain some community college training as a way of increasing their rank in job queues. Then employers will hire individuals of increasing education levels for jobs whose skill content has stayed constant, without paying higher wages -- a process of educational inflation. Although both skills upgrading and educational inflation imply that employers hire individuals with higher levels of education into specific occupational categories, the two differ since skills upgrading implies higher skill levels and wages

in addition to higher educational requirements. The demonstration that educational inflation has in fact taken place in the post-World War II period is a favorite among those attacking the irrationality of the current educational system.[20]

The Entrepreneurial Model

The three models described so far assume that the only important actors are firms and workers, and that the supply of students is a function of the economic decision of prospective students alone. A rather different supply-side model acknowledges that community colleges themselves have played an entrepreneurial role in attracting students, and so the increased enrollments during the 1970s may be due more to skillful entrepreneurship than to rational decisions of students.[21]

The entrepreneurship of community college administrators has taken several forms. Most obviously, they have been aggressive in promoting the virtues of community colleges, both to prospective students in conventional forms (advertising and recruitment, for example) and to funding sources like state legislators. Second, they have played an instrumental role in converting community colleges from academic transfer programs to terminal vocational programs (although there has been disagreement within community colleges about academic versus vocational goals). Third, community colleges have become increasingly aggressive in drumming up new business, by setting up "customized training" for individual firms and creating other short-term, non-degree programs for specific skills, and by convincing various semi-professional groups and employers of the value of continuing education and skills upgrading courses at community colleges.[22] Although the effectiveness of these efforts remains unknown, community college personnel have clearly not been neutral administrators matching demand from firms with students. In their entrepreneurial efforts, the community colleges have been able to draw upon external support from foundations, various commissions, critics of "over-education," and businessmen; and the community colleges have been heir to a powerful tradition of vocationalism in education to make their cause legitimate.

Some entrepreneurial activities are intended to create demand and supply at the same time, when community colleges set up customized training programs with a high probability that successful completers will be hired by the firm for whom the program is established. However, the entrepreneurial model raises the possibility that students enroll without a good probability of finding a job for which they are trained. In the human capital model and the signaling view, this is impossible since a low return to community college education will subsequently reduce enrollments; in the job competition model, enrollments in community colleges will fall if students find out that attendance fails to improve their position in the queue. However, if we drop the assumption of perfect information about returns, then entrepreneurship can increase the supply of students even when the return to attendance is low. At the moment, there is no good reason to assume anything like perfect information for students: the general evidence about the economic returns to two-year colleges is still unclear, and at the local level information available about the labor market success of community college students is poor.[23]

The Cooling-Out Model

In the cooling-out view first described by Burton Clark in 1960,[24] well before the recent upsurge in community college attendance, community colleges serve to discourage working class and lower-class individuals from attending four-year institutions -- not by the bald and potentially illegitimate mechanism of denying them access, but by subtly changing their expectations and aspirations to conform to the "reality" that there are not enough places in four-year institutions for all who want a college education. In the cooling-out process, the easier entrance standards of community colleges and lower direct costs of attendance (including the fact that most students can live at home) serve as initial filters stratifying higher education by class. The process of testing and counseling then completes the stratification process, as high proportions of community college students decide that continuation is beyond their abilities, too expensive, or not what they want to do. The shift of the community colleges in the last twenty years towards terminal and vocational programs

has reinforced the cooling-out mechanism, as increasing proportions of students enroll in programs from which transfer to B.A. programs is impossible. In the development of the cooling-out function, the entrepreneurial activities of the community college administrators have been important in luring students to the community college and persuading them of the value of vocational rather than academic training.

There is little doubt that the community colleges have in fact served to stratify higher education, since the class backgrounds of community college students and those at four-year institutions are so different.[25] Furthermore, since community colleges have an increasing proportion of higher education enrollments, it is likely that stratification is becoming increasingly sharp. However, the existence of class-based stratification does not explain why students themselves continue to enroll in the absence of a higher return to community college attendance; that is, the cooling-out model could not work, despite the strenuous efforts of community college administrators, if working-class students did not see attendance in two-year programs as in their interests. Therefore the cooling-out view requires either that there be a substantial economic return to community college, or that information about returns be poor if the returns are in fact low.

The Model of Substitution

Still another explanation of enrollment increases is related again to the entrepreneurial model. Given the current flexibility of community college programs, there are a number of post-high school, pre-B.A. programs that are essentially equivalent to some community college programs: proprietary training programs, like secretarial schools; private non-profit programs, like the certificate programs hospitals have run for nurses and technicians; formal training programs run by firms for their own employees; some apprenticeship programs run by unions or by associations of employers; and military training. From the student's point of view, the choice among these alternatives should turn simply on rates of return; if the earnings advantage of different programs is the same, then students should choose the cheapest program. The expansion of

low-cost public programs over the past two decades may have caused many students to shift from more costly private programs to cheaper community college programs.

From the vantage of employers, alternative training programs may not be exactly equivalent; for example, firm-based programs often teach a great deal of firm-specific material, especially related to appropriate attitudes, that would be difficult and illegitimate to reach in public programs.[26] But if alternative training programs are equivalent and employers have borne some training costs, then employers will also want to substitute public training for private training. This method of socializing training costs has occurred, for example, in nursing, where the fraction of graduating nurses with diplomas from hospital programs fell from 74% in 1965-66 to 36% in 1972-73, while the proportion of A.A. degrees increased from 10% to 42%.[27] This process of substitution may be accelerated by the entrepreneurial activities of community college administrators searching for new programs to offer. In general, this kind of entrepreneurship has been viewed with approval as contributing to the "public-private partnership" that can make community colleges more effective in terms of their placement rates while they simultaneously serve the interests of employers in a well-trained labor force. However, the model of substitution does not imply any real change in the kinds of occupational training offered; it merely represents a shift in the burden of paying for training from students and employers to the public sector.

To be sure, the model of substitution can work against community colleges as well. The prime example has been the effort by some four-year colleges to institute both two-year programs and four-year vocational programs, with degrees like the Bachelor of Arts in Technology and the Bachelor of Engineering Technology, as a way to compete with community colleges for students.[28] Although this trend has not yet affected a significant fraction of higher education enrollments, it may accelerate if four-year colleges continue to face declining enrollments while community colleges continue to expand. This development may provide another case study of the vocationalizing influence at work in higher education.

Marxist Interpretations

Examining the beneficiaries from the substitution model leads naturally to considering a Marxist view. From a functionalist Marxist perspective -- one which most Marxist writers would consider relatively crude -- the state in attempting to serve the interests of capitalists will increase vocational training to supply the labor needs of firms for a technically well-trained and appropriately well-behaved labor force; in fact, the state may over-supply training because a pool of unemployed but adequately trained workers will keep wages down. From a more sophisticated structural perspective, the democratic state in a capitalist society must contend with both the pressure of capital for support and legitimation and with democratic pressures to provide benefits to a wide range of citizens, to provide greater equality and greater equality of opportunity, and to constrain firms and markets in various ways.[29] From this perspective, vocational programs -- or, more generally, vocational conceptions of public education -- have been politically popular because they help minimize the potential contradiction between the uses of public resources to support capital and their uses for more democratic ends: as long as students are convinced that vocational programs provide them with greater access to labor market opportunities, then both students and capitalists will support vocational programs as meeting their own interests.[30] At the post-secondary level, the appeal is broader still: post-secondary vocational programs appear to serve simultaneously the interests of students in greater access to higher-paying occupations, the interests of employers in a well-trained labor force, and the role of the schools in reproducing class status through a stratified public education system that still appears to provide opportunity. Since post-secondary vocational programs satisfy the contradictory demands placed on the liberal democratic state, this also explains why, in a period when other levels of public education are under attack for both fiscal reasons and their presumed inadequacies, post-secondary vocational programs have escaped most of this criticism.

Like the entrepreneurial and the cooling-out models, the Marxist view raises the possibility that students may enroll in post-secondary programs even where the economic returns are non-existent, because of the

ideological power surrounding the vocational conception of schooling and because information about returns is sparse. Thus most left-wing critics of community colleges have argued that the economic returns are essentially zero and therefore community colleges are entirely mechanisms of class stratification.[31]

Several concerns are common to many of the theories that might explain enrollment increases in the community colleges. One is the presumed expansion of jobs in those middle-level occupations for which community colleges tend to prepare their students. Whether this expansion comes from sectoral shifts in the economy, from technological change, from de-skilling, from skills upgrading, or from educational inflation is a secondary question, with substantial differences among theories. Another issue that cuts across different theories is the nature of supply: whether students respond primarily to earnings differentials or to direct and opportunity costs, and whether other, essentially non-economic factors -- especially the entrepreneurial efforts of community college administrators and the ideological power of vocationalism -- have independent effects on enrollment remain central questions. Finally, the division of the benefits of vocationally-oriented community colleges remains unclear; despite the rhetorical claims, their effects for students, employers, and society as a whole remain unknown.

The Problems of "Non-Completers"

Although enrollments in community colleges have always received the greatest attention, the number of graduates from community colleges -- those with A.A. degrees and other certificates -- has consistently been less than 10% of enrollments. There are several reasons for the discrepancy. The most obvious is that many students in community colleges are enrolled in non-degree programs. In 1978-79, there were 6,724,189 students enrolled in vocational programs beyond the secondary level; of these, 29% were enrolled in institutions granting A.A. degrees, 14% were in long-term programs with terminal certificates and degrees of other than the A.A. (largely technical institutes), and the remaining 57% were

in short-term programs of less than six months which do not grant A.A. degrees and tend not to grant certificates.[32] (In addition, about half the enrollments in these short-term adult programs are in programs considered to be occupationally non-specific; these may be designed to prepare students for specific vocational programs, or may be completely avocational.) Although no data are available, there is some feeling among those examining community colleges that short-term programs have increased faster than other forms of enrollment.

The second difference between enrollments and degrees involves drop-outs. Data on drop-out rates are difficult to obtain. In the VEDS data, for example, the distinction between a drop-out and a completer is determined by the community college or technical institute, and there is wide variation in the conception of who is a completer. However, scattered evidence suggests that drop-out rates are extraordinarily high: the national VEDS data for 1978-79 reported 204,557 post-secondary completers compared to 1,949,558 enrolled, and 165,844 long-term adult completers compared to 969,560 enrolled; assuming two-year programs, these figures imply drop-out rates of two-thirds to three-quarters. For 1980-81, community colleges in Texas report 133,031 post-secondary vocational enrollments and 29,445 completers, while technical institutes reported 9,574 enrollments and 2,704 completers,[33] both implying drop-out rates of about one-half of those enrolling.

However, some of these "drop-outs" may have left school for legitimate reasons related to their training. Some community college administrators have become aware of various "early exit points" in the curriculum, where students have learned enough to get a training-related job without finishing the formal program; some have even moved to formalize early exit points by awarding different kinds of certificates after various stages of a two-year program.[34] The finding that completers of a community college program have no economic advantage over those who enroll but fail to complete[35] may simply indicate that short-term training is effective and early exit is rational. Alternatively such a finding might suggest that community college enrollment is used as a screen for

initiative, or that dropping out may increase when employment opportunities become available. Still another possibility is that drop-outs occur as students learn more about the nature of training and job opportunities and discover that rates of return for completion are not high enough to justify completion (at least in some programs). This scenario suggests that the entrepreneurial efforts of some community college administrators to enroll increasing numbers of students may be misplaced, and may lead simply to high fractions of students dropping out before completion. Thus the meaning of early exit is not at all clear.

Above all, the magnitude of "non-completion" indicates that measuring the importance of community colleges by their enrollments alone may be misleading. It is therefore necessary to disentangle several strands of enrollment and to distinguish several different kinds of completion. One alternative would be to examine enrollments according to the eventual labor market career of students. In every program area, we can decompose total community college enrollments in a particular year into the following mutually exclusive groups:

1. Those who complete the program in which they are enrolled and find a job in the area for which they have been trained. Since so many students are enrolled in non-degree short courses, completion need not imply receipt of an A.A. degree or any other formal award.

2. Those who complete the program in which they have enrolled but fail to find a related job. (What constitutes a "related job" is of course itself at issue, particularly if a post-secondary program is general in its educational goals.)

3. Those who fail to complete the program but still find a job in the area for which they have been trained.

4. Those who fail to complete the program and fail to find a related job.

5. Those with no serious vocational purpose in mind when they enroll. This category is necessary because of the possibility that large

numbers of enrollments -- particularly in vocationally non-specific programs -- are essentially recreational, as they have often been claimed to be at the secondary level.

Such a decomposition would allow a more precise analysis of both the reasons for recent enrollment increases and of the different models explaining the role of community colleges in labor markets.

Changes in Occupational Demand, Degrees, and Enrollments

Several explanations for growing community college enrollments outlined above -- including the conventional explanation offered by community college administrators themselves -- emphasize growing demand in middle-level occupations. Whether wage competition or job competition describes the mechanism by which occupational demand leads to increasing enrollment, and whether increasing demand comes from sectoral changes, de-skilling, educational inflation, or skills upgrading are secondary issues; the various explanations all imply that enrollment increases should match increases in occupational openings. In this section, I will compare the growth rates of specific occupations with the growth rates of enrollments and degrees awarded in community college vocational programs, to see how valid these explanations seem to be.

There are, to be sure, several ways of testing the proposition that the growth in the jobs available accounts for enrollment increases at the community college level. However, if the proportion of jobs in an occupation held by those who have attended or completed community college remains constant -- if, that is, there is no increasing tendency for community college students to fill job openings at the expense of individuals with other kinds of preparation -- then the growth rate of opportunities for community college students is equal to the growth rate of total employment.[36] Then, if the growth of job opportunities has caused the recent expansion of the community college, the growth rate of employment in specific occupations should roughly match the growth rate of enrollments in programs designed to train individuals for those occupa-

tions, or alternatively should match the growth rates of degrees granted rather than community college enrollments.

Data on degrees are probably more accurate, since they have been collected consistently year after year while the collection of enrollment figures has changed constantly. Enrollment data may include a potentially large number of students who enroll casually, without adequate information or concrete plans, and who are likely to drop out without acquiring significant skills. If students enter programs where occupational demand is weak and then drop out at a greater rate than students in programs with strong demand patterns, then rates of completion -- or degrees and certificates -- will be more closely related to demand than will enrollment. That is close to what we see in data on enrollment and degrees: while the relationship between enrollment and employment varies wildly, the relationship between degrees received and employment is much more regular. This suggests that the data on degrees may be a more reliable indicator of what is really going on in post-secondary vocational programs.

Table 1 presents data on the number of Associate (or A.A.) degrees and other formal awards below the B.A. level for 1973 and 1978, together with the growth rates of related occupations between these two years.[37] Most obviously, A.A. and other awards grew by 60% between 1973 and 1978, while jobs in all occupations grew much more modestly, by 12%. While growth rates of degrees vary substantially among different programs, in all but a handful of cases the increases in degrees are far greater than increases in related employment opportunities. The exceptions, where occupational demand is increasing faster than degrees granted, are largely confined to those occupations with the lowest skill levels -- personal services, computer operators, keypunchers, the category of "general data processing," and dental assistants; skilled occupations in which the degrees fall short of occupational increases are computer maintenance and civil technology.

The growth of vocational degrees and certificates has been especially large for business and commercial programs, which accounted for 40% of all

increases in degrees between 1973 and 1978; this suggests a trend toward business and white collar occupations and away from the trade and industrial programs that have been the core of vocational training. The area of "natural science technologies" has the second highest growth levels. This is largely due to enrollment increases in agriculture-related programs, where enrollments increased by 88% even as total employment in agriculture was declining by about 5%. Increases in health-related degrees also prove to be substantial -- about 60%; about half of the increase is due to increases in nursing (RN) degrees, with almost another quarter of the degree increases coming from a miscellany of relatively new health technology programs. One surprise in Table 1 is that degrees in computer-related technologies grew more slowly that in any other area. The low average growth rate masks moderately high growth -- 59% -- for degrees in computer programming, while less skilled areas (like computer operators and computer maintenance) grew much more slowly or even declined, in the case of keypunching.

The results in Table 1 suggest that the image sometimes conveyed of post-secondary vocational education -- that of an educational institution whose enrollments are expanding to keep pace with increasing high-tech fields -- seems not to be valid. In fact, the patterns of degrees shows a shifting emphasis within post-secondary vocational programs toward "low-tech" occupations and toward those programs that have traditionally been the domain of vocational education. The especially rapid increases in "business and commercial technologies" -- particularly those areas like banking, finance, marketing, accounting, and general business -- reflect the shift that has gone on elsewhere in education (especially in four-year colleges) toward business. Within the health field, which has been substantially changed by new technology over the past two decades, the majority of growth comes within the traditional field of nursing, with programs for relatively semi-skilled "assistants" also growing rapidly. In the area of "mechanical and engineering technologies, " there has been substantial growth in the field of electromechanical and instrumentation technologies, but the other high rates of growth have come in relatively traditional areas like automotive and diesel tech-

Table 1

Growth Rates of Selected Associate Degrees and of Related Occupation, 1973-1978

	(1) Degrees* 1972-73	(2) Degrees* 1977-78	(3) Growth Rate of Degrees	(4) Growth Rate of Related Occupations
Total Degrees	174,101	278,969	60.2%	11.8% (all occupations)
Business and Commercial Technologies				
Total	55,311	96,930	75.2	--
Business and Commerce, General	11,402	21,670	90.1	11.6
Accounting	6,331	12,135	91.7	30.0
Banking and Finance	460	1,110	141.3	12.6
Marketing, Distribution, Purchasing	9,989	25,293	153.2	8.2
Secretarial	15,526	23,132	49.0	17.1
Personal Service	552	815	47.6	52.0
Photography	661	866	31.0	24.0
Printing and Lithography	450	719	59.8	4.5
Hotel and Restaurant	1,451	2,149	48.1	19.2
Applied and Graphic Arts	4,107	5,460	32.9	9.3
Data Processing Technologies				
Total	7,640	9,339	22.2	--
Data Processing, General	4,584	5,095	11.1	48.1
Keypunch Operators	327	264	-19.3	7.9
Computer Programmers	2,118	3,368	59.0	32.1
Computer Operators	249	263	5.6	32.0
Computer Maintenance	103	319	209.7	26.0

Table 1 (Continued)

	(1)	(2)	(3)	(4)
Health Services and Paramedical Technologies				
Total	42,910	68,447	59.5%	--
Health Services Assistant	121	2,465	1937.2	51.6%
Dental Assistant/ Dental Hygiene	4,720	5,154	9.2	14.0
Medical Lab Assistant	1,902	3,819	100.8	45.5
Radiological Technologies	2,157	3,959	83.5	27.6
Nursing, RN	23,252	36,193	55.7	35.1
Nursing, Practical	2,637	3,019	14.5	12.3
Occupation and Physical Therapy	904	1,636	81.0	73.4
Surgical, Optical, Medical Record, Medical Assistant, Psychiatric, and Electrodiagnostic Technologies	4,955	9,068	83.0	73.9

Table 1 (Continued)

	(1)	(2)	(3)	(4)
Mechanical and Engineering Technologies				
Total	34,781	51,200	47.2%	--
Mechanical and Engineering, General	2,455	4,746	93.3	15.9%
Aeronautical and Aviation	2,378	2,679	12.7	0.8
Architectural Drawing	1,897	2,764	45.7	0.3
Chemical Technologies	576	748	29.9	11.8
Automotive Technologies	3,676	5,697	55.0	14.8
Diesel Technologies	603	1,462	142.5	19.5
Welding Technologies	652	1,300	99.4	10.6
Civil Technologies	2,290	2.257	-1.4	5.5
Electronics and Machine Technologies	6,397	12,297	92.2	14.9
Electromechanical and Instrumentation Technologies	1,455	2,826	94.2	48.4
Industrial and Mechanical Technologies	3,269	4,569	39.8	19.5
Construction and Building Technologies	3,648	5,789	58.7	11.5

Table 1 (Continued)

	(1)	(2)	(3)	(4)
Natural Science Technologies				
Total	9,242	15,980	72.9%	--
Agricultural Technologies	3,440	6,457	87.7	-4.7%
Forestry and Wildlife	1,671	1,992	19.2	11.1
Food Services	704	2,703	283.9	25.9
Laboratory Technologies	189	298	57.7	32.6
Public Service-Related Technologies				
Total	24,167	37,073	53.4	--
Education	4,839	6,187	27.9	2.6
Library Assistant	586	549	-6.3	41.0
Police, Law Enforcement	11,658	17,278	48.2	10.8
Recreation, Social Work	2,269	4,238	86.8	45.1
Fire Control	1,448	2,827	95.2	4.7
Public Administration and Management	240	840	250.0	25.4

*"Degrees" refers to "Associate degrees and other formal awards below the baccalaureate", and therefore includes various kinds of formal certificates.

SOURCES: Columns (1) and (2): U.S. Department of Labor, Bureau of Labor Statistics, Occupational Projections and Training Data, 1980 Edition, Bulletin 2052, Sept. 1980, Table C-5. Column (3): Employment and Training Report of the President, 1981, Table A-22; Employment and Training Report of the President, 1977, Table A-32.

nologies, welding, and general mechanical and engineering programs. Thus it is difficult to substantiate the claim that post-secondary training has been especially stimulated by the growth of new technologies and the new occupations that emerge from them; although such new occupations are generally represented, the growth of more conventional programs and of business-oriented curricula is a more powerful reason for the growth in degrees.

Despite inconsistencies in the data, enrollment figures can be used to corroborate the results in Table 1. Enrollment data for 1972-73 and for 1978-79 are available for specific program areas, for both post-secondary enrollments -- taking place in community colleges and other institutions granting A.A. degrees -- and adult enrollments including enrollments in both technical institutions and in short-term programs (those less than six months).[38] These enrollment patterns can then be compared to the growth rate in detailed occupations between 1973 and 1979.[39] The results of this comparison (not presented here but available from me upon request) can be easily summarized. As in the case of degrees, post-secondary enrollment grew at a faster rate (33%) than did all jobs between 1972 and 1979 (15%). Of the major categories of curriculum, the highest rates of growth occurred in distribution (97%), gainful home economics (61%), office occupations (69%) and technical areas (52%). In contrast, the trade and industrial area -- the area that has always formed the core of traditional vocational education -- grew at the relatively small rate of 10%, and health-related occupations also grew at a relatively slow rate of 7%. Thus post-secondary enrollments increasingly involve white-collar rather than blue-collar positions; among blue-collar positions related to manufacturing, there has been a shift from the lower skill levels typical of trade and industrial programs to the higher skill levels of technical programs. At this gross level, the trends in post-secondary enrollments are close to trends in the occupational structure as a whole, which has been moving away from manufacturing and towards services and office occupations, and towards a greater use of technicians for which post-secondary technical programs might prepare students.

However, this pattern of roughly similar enrollment and occupational growth falls apart when we examine specific occupational areas. In fact, what is most striking about enrollment patterns is how much variation there is among different programs -- variation that may be due to inaccuracies in the data. Despite this variation, some clear generalizations emerge. In a large number of occupational areas, enrollment increases have substantially outweighed demand as measured by occupational growth; these areas seem to fall predominantly in white-collar occupations, especially in the business-related distributive area. There are only a small number of occupations for which enrollment increases fall substantially short of employment increases, and most of these are in the traditional area of trade and industrial education.

The growth of enrollments in various areas with substantial technological content has generally been steady though undramatic. The growth rate of computer-related programs, which by itself contributed about 14% of post-secondary enrollment growth, has kept pace with (but not exceeded) employment growth. Enrollments in the technical area have contributed about 24% of total enrollment growth at the post-secondary level. The growth rates of health technology programs have been relatively high (even though the numbers involved have been small). However, there is no real tendency for enrollments in technical areas to soar beyond increasing demand levels, as is true for many business and office occupations; enrollment increases have been relatively more closely related to demand patterns. Finally, there is a complex pattern of movement among different levels of vocations preparation. In a number of program areas there has been a substantial shift from post-secondary to adult programs, indicating more enrollments in shorter and less formal programs. These shifts seem to be more frequent in the occupations with the lowest skill requirements.

Despite the differences in the data on degrees and the data on enrollments, several common conclusions emerge. One is the evidence that both post-secondary enrollments and degrees awarded have on the whole increased faster than employment in the relevant occupations. The second

is the shift toward business, commercial, and other white-collar occupations, and away from the trade and technical occupations that have always formed the core of vocational programs at the secondary level. Third, there is a noticeable shift within post-secondary programs away from those requiring the lowest skill levels, a shift which seems to reflect a tendency for programs with relatively low skill content to move from formal, two-year programs with degree programs to the shorter, less formal programs associated with adult enrollments. On the other hand, the growth in degrees and enrollment in emerging high-tech areas, like computer and health technologies programs, is solid but not spectacular. Finally, the growth patterns for several specific training areas are consistent; for example, business-related programs are most likely to display growth rates far in excess of employment growth; enrollments and degrees in agricultural programs continue to increase even as agricultural employment is falling; enrollments and degrees in several programs related to public employment -- especially police and fire protection -- have grown substantially; enrollments and degrees in nursing and medical technologies have consistent increases, and civil technology shows a consistent decrease.

Above all, the results indicate that the conventional view offered by community college administrators for the rapid growth of two-year colleges during the 1970s, though not incorrect, is incomplete. While there has been substantial growth in the middle-level occupations for which community colleges train, this occupational growth is insufficient to explain all enrollment growth. Furthermore, while emerging technical occupations explain a solid portion of enrollment growth, they do not by any means account for a majority of new growth, and large enrollment increases have come in traditional program areas (like nursing and clerical areas) while others have come in commercial areas unrelated to new technologies. Instead, a "pluralist" approach -- one which considers a variety of explanations for enrollment increases, because of the variety of labor markets community colleges train for -- is more appropriate.

How Might Enrollment Increases be Analyzed?

At first blush, the results in the previous section might be taken to mean that "too many" individuals are being trained in community colleges for the jobs available, that many students are therefore unable to find jobs in the areas for which they are trained or -- seeing the dearth of jobs -- contribute to the high dropout rates characteristic of community colleges. This would help explain those studies which have found essentially no economic return to community colleges. One way to examine this possibility is to collect the data necessary to analyze empirically the decomposition of enrollment described on page 17 above. In theory, some appropriate data are available. In Texas, for example, the Vocational Education Data System (VEDS) collects data through a system of student questionnaires. However, the follow-up data is generally poor, partly because the follow-up takes place within six months of leaving and partly because the response rate is less than 50% (and response rates are probably biased). Thus decomposing enrollments accurately will depend on improvements in the VEDS data. Other follow-up data, like the National Longitudinal Survey data or the Class of 1972 data, may also be useful, though they do not have the same amount of detail on community college experiences.

An alternative explanation of enrollment and degree increases recognizes that job opportunities for post-secondary vocational students may not be restricted to employment growth, but may come in addition from community college students gaining a large proportion of available jobs in a particular occupational category. Most occupations -- with the exception of the highest professions -- have a variety of routes into them. For example, secretaries can learn their skills in high school, in community college programs, in proprietary schools, on the job while working as clerks, or on their own; the occupation of computer programmer includes individuals at all levels, both with graduate training, B.A. training, community college training, preparation in proprietary schools and company schools and on-the-job training. If the fraction of positions held by community college students increases over time, then enrollment increases in excess of increases in the employment growth can

be absorbed -- though at the expense of individuals in other forms of training. From the viewpoint of community college administrators and students, this source of job opportunities is equivalent to jobs available through simple expansion. However, from the viewpoint of employers and from a social viewpoint, an increasing fraction of specific occupations held by community college graduates may or may not be efficient or equitable.

The different theories represented above suggest several possibilities. First, the model of simple substitution -- or substituting community college programs for equivalent programs, as has happened in nursing -- describes a process of eliminating some mechanisms of access in favor of community college programs. Second, the process of educational inflation in relatively low-skilled occupations implies that an increasing fraction of positions go to community college students, where previously only a high school diploma (or even some high school) was necessary. For example, the child care field has been in the process of professionalization, with more individuals seeking degrees as a way of establishing their professional training; expanding courses in areas like real estate also seem to indicate credential inflation. Skills upgrading can similarly increase the fraction of positions going to community college graduates, or can otherwise increase enrollments among those already in occupations; for example, the increasing enrollments in fire and police protection represent a tendency for communities to require more training -- or periodic retraining -- of their police and fire fighters. Finally, the process of de-skilling can also increase the fraction of positions won by community college graduates rather than those with more extensive preparation, although de-skilling also operates to increase the positions in lower-level occupations -- technicians in place of engineers, for example -- rather than changing routes into specific occupations; the increase in computer programming at the community college level may also be evidence of de-skilling, since such programmers typically perform the more routine tasks that have emerged as the field of computer programming has gone through a process of de-skilling.[40] Thus enrollment increases may, from the view-point of stu-

dent and administrators, be legitimately above employment increases if the "penetration" of an occupation -- the tendency of community college graduates to get new jobs in an occupation -- is increasing.

To analyze the possibility that such "penetration" has been increasing, and potentially to distinguish examples of educational inflation, skills upgrading, and deskilling, it would be appropriate to focus on jobs (rather than individuals), and to examine the distribution of training backgrounds for new hires at different times. If, for example, the proportion of community college graduates has increased relative to the proportion of high school graduates without any detectable skill increases, this would support the hypothesis of educational inflation. While analyses of occupations by level of training are still comparatively rare,[41] this kind of analysis could be performed with a data set on individuals that is sufficiently large so that there are a reasonable number of individuals in each specific occupation. A second requirement, in order to examine trends, is that the data be available for at least two dates; this effectively limits the potential data sets to the decennial census, the annual Current Population Survey, and longitudinal studies.

A third area for examination involves the wage levels associated with the different outcomes of attending post-secondary programs. That is, the wage differentials by area of completing versus not completing a program, or of finding a training-related job versus some unrelated job, have still not been adequately measured; the earnings differentials (if any) among jobs that have been de-skilled, those that have been subjected to educational inflation or skills upgrading, and those that have simply expanded have yet to be investigated. These differentials all affect the overarching question of whether there is a wage advantage associated with post-secondary vocational programs, or whether (as at the secondary level) the economic advantage of additional training is confined to certain programs but not others. In addition, analysis of wage differentials would shed some light on whether the human capital model of wage competition or

Thurow's model of job competition more correctly describes specific labor markets, since the two views differ on their implications for wage levels.

A fourth area to analyze more closely involves the determinants of community college enrollments (or degrees received), through the standard econometric models that have been used to explain senior college enrollment patterns. Such an approach would have the advantage of describing behavioral responses -- for example, the behavioral responses of students to employment growth (or to unemployment rates) and could yield substantial information about both the demand-related and supply-related causes of enrollment growth. At least three different sources of variation should be considered: variation over time; variation across programs; and variation across states. Pooling cross section data for several years may therefore be necessary; for example, data on degrees by program areas for several years would allow the separation of variation due to trends and cyclical effects from those due to variations in relative demand. The purpose of adding variation across states is that community colleges are generally state educational systems, and a majority of their funding comes from the state rather than the local level; therefore many supply-related decisions that affect enrollment patterns -- how many community colleges to have, where to locate them, what fees to charge, what programs to offer, how large to allow them to be -- are essentially state (or state-local) decisions, and should therefore vary systematically among states. Although there are some data limitations,[42] it would be possible to collect data reflecting all three sources of variation.

Among the important independent variables, employment in the relevant occupations (or employment growth rates) would reflect one dimension of demand. Another demand-related variable might be the unemployment rate, though this variable also affects the opportunity cost of schooling and therefore combines both demand and supply factors. Other phenomena related to demand -- especially educational inflation and de-skilling -- would be considerably more difficult to measure. However, educational inflation in specific occupations could be measured by the recent in-

creases in average educational attainments. De-skilling could be reflected by changes in the skill requirement of specific occupations, as measured by the General Education Development (GED) and Specific Vocational Preparation (SVP) scores developed by the Department of Labor. In an econometric model, it should also be possible to distinguish two different kinds of causal mechanisms related to the supply of students. The first, associated especially with the human capital school, describes the factors which cause students in any educational "market" to go to school, especially the rate of return; occupation-specific earnings, the earnings differential associated with some college, tuition and other direct costs, and measures of opportunity costs including the unemployment rate are among the variables which would influence student decisions to continue on in school rather than work. The second kind of supply-side force, institutional rather than economic, involves the efforts of community colleges themselves and of states to institute large or small community college systems; relevant independent variables include state income and other measures of ability to pay for community colleges, recruitment efforts (perhaps measured by the relative number of administrators), ease of access (measured by the density of community colleges), and variety of programs offered.

Finally, enrollment patterns among different levels of education are interrelated: Community college enrollments obviously depend on the number of high school graduates, and community college and four-year college enrollments may be interrelated because many potential students can enroll at either, depending on the costs, perceptions of return, access, and other such factors. More generally, the hypothesis that increasing community college enrollments are partly due to substitution among different training programs suggests that the interrelationships among levels of education must be considered. Therefore, a complete model of enrollment at the community college level would be part of a larger model describing high school and four-year college enrollments as well, and potentially enrollments in other private and proprietary programs in addition.

The expansion of the community college in the past twenty years provides a kind of laboratory allowing us to investigate the general process of educational change and its relationship to labor markets. The similarities between this and earlier periods of educational expansion are striking, and the period of change is far from over. The transformation of the community college into an explicitly vocational institution is not yet complete, and the two-year colleges are still relatively fluid and flexible in their goals, not yet having developed into relatively rigid institutions like the conventional colleges and the high schools. But if the past is any guide, they are likely to do so; the time to examine their development is now, before the experiment is complete.

FOOTNOTES

1. "Fall Enrollment May Set Record Despite Economy, High Tuition," Chronicle of Higher Education, September 15, 1981; "4-Pct. Enrollment Increase Projected for 2-Year Colleges," Chronicle of Higher Education, August 11, 1982.

2. American Council on Education, 1981-82 Fact Book for Academic Administrators, (Washington, D.C.: ACE, 1981), Tables 57 and 75. Data on different age groups comes from the Digest of Educational Statistics, 1981, Table 79.

3. For these debates, see L. Stephen Zwerling, Second Best: The Crisis of the Community College (New York: McGraw Hill, 1976); Fred Pincus, "The False Promise of Community Colleges: Class Conflict and Vocational Education," Harvard Educational Review 50 (August 1980); 332-361; Steven Brint and Jerome Karabel, "The Transformation of the Two Year Colleges: From Liberal Arts to Vocational Training," unpublished, Huron Institute, Cambridge, September 1980.

4. American Association of Community and Junior Colleges, Types of Programs Offered in Two-Year Colleges, (Washington, D.C.: AACJC, 1977).

5. These data came from the first year of the Vocational Education Data System (VEDS), in National Center for Educational Statistics, The Condition of Vocational Education, (Washington, D.C.: GPO, 1981), Table 3.2. These data are difficult to interpret because of ambiguity in what short-term and long-term adult programs include; thus, the VEDS data and the fall enrollment figures may not be compatible.

6. National Center for Educational Statistics, Associate Degrees and Other Formal Awards Below the Baccalaureate, 1970-71, Table 9; NCES Associate Degrees and Other Awards Below the Baccalaureate, 1974-75, Summary Data, Table 6. A relatively small number of these degrees are awarded by four-year rather than two-year institutions.

7. It is difficult to compare these data with earlier figures because of changes in ways of counting adult vocational education. These data come from the Vocational Education Data System (VEDS); see The Condition of Vocational Education, Table 3.1; the 1979-80 data are taken from unpublished VEDS data.

8. However, the evidence on returns to post-secondary vocational programs is still not extensive. Among other evaluations of secondary-level vocational education, see John Grasso and John Shea, Vocational Education and Training: Impact on Youth, (Berkeley: Carnegie Council on Policy Studies in Higher Education, 1979); Beatrice Reubens, "Education for All in High School?" in James O'Toole, ed., Work and the Quality of Life, (Cambridge: MIT Press, 1974); The Vocational Education Study: The Final Report, Vocational Education Study Publication No. 8,

(Washington, D.C.: National Institute of Education, September 1981), Chapter 7. For evidence on post-secondary programs, see David Breneman and Susan Nelson, Financing Community Colleges: An Economic Perspective, (Washington, D.C.: The Brookings Institution, 1981); Larry Blair, Michael Finn and Wayne Stevenson, "The Returns to the Associate Degrees for Technicians," Journal of Human Resources 16 (Summer 1981): 449-458, Harry Heinemann and Edward Sussna, "The Economic Benefits of a Community College Education," Industrial Relations 10 (October 1977): 345-354; Wellford Wilms, Public and Proprietary Vocational Training: A Study of Effectiveness, (Berkeley: Center for Research and Development in Higher Education, 1974); Wellford Wilms and Stephen Hansell, "The Dubious Promise of Post-secondary Vocational Education: Its Payoff to Dropouts and Graduates in the U.S.A.," International Journal of Educational Development 2 (Spring 1982): 43-59.

9. The parallels have been discussed in Martin Trow, "The Second Transformation of American Secondary Education," International Journal of Comparative Sociology 2 (1961): 144-165; Jerome Karabel, "Community Colleges and Social Stratification: Submerged Class Conflict in American Higher Education," Harvard Educational Review 42 (November 1972): 521-562; and Marvin Lazerson and W. Norton Grubb, American Education and Vocationalism: A Documentary History, 1870-1970 (New York: Teachers College Press, 1974).

10. On the conventional view, see Pincus, op. cit.; N.C. Harris and J.F. Grede, Career Education in Community Colleges (San Francisco: Jossey-Bass, 1977), especially Chapter 3; Fred Pincus, "Class Conflict and Community Colleges: Vocational Education During the Reagan Years," forthcoming, Review and Proceedings of the Community College Humanities Association. The argument in the latter paper by Pincus is in many ways similar to my own.

11. C.R. Monroe, Profile of the Community College (San Francisco: Jossey-Bass, 1972), p. 82.

12. For a historical argument for a "pluralist" interpretation, see W. Norton Grubb and Marvin Lazerson, "Education and the Labor Market: Recycling the Youth Problem," in Harvey Kantor and David Tyack, eds., Work, Youth, and Schooling: Historical Perspectives on Vocationalism in American Education (Palo Alto: Stanford University Press, 1982).

13. That is, there is an exogenous shift outward in the demand curve, and then a shift along the stationary supply curve.

14. On de-skilling, see Harry Braverman, Labor and Monopoly Capital (New York: Monthly Review Press, 1974); Anderew Zimbalist (ed.) Case Studies on the Labor Process (New York: Monthly Review Press, 1979).

15. In this case, the supply curve shifts outward, and there is then a shift along the stationary demand curve.

16. For current comments about the effect of unemployment, see, for example, "Four Percent Enrollment Increase Projected for 2-Year Colleges," Chronicle of Higher Education, August 11, 1982, p. 3. The hypothesis of declining opportunity costs may also be a reason for increasing high school enrollments in the 1890-1920 period, as enrollments seem to have increased faster in states where blue-collar work -- the usual source of employment for youth -- was declining relative to white-collar work. See Bruce Fuller, "Youth Job Structure and School Enrollment, 1890-1920," unpublished manuscript, October 1982.

17. On signaling, see especially Michael Spence, "Job Market Signaling," Quarterly Journal of Economics 87 (August 1973): 355-379. There is still no good evidence for the general validity of the signaling model; see, for example, the evidence and the review of other work in W. Norton Grubb, "Signaling, Credentialing, and Variation in the Return to Schooling," unpublished, March, 1978.

18. This selection mechanism also implies that earnings functions that fail to measure ability adequately may understate the true economic value of community college. The more conventional view is that failure to consider the supposedly higher ability levels of community college students tends to overstate the returns.

19. On the job competition model, see Lester Thurow and Robert E.B. Lucas, The American Distribution of Income: A Structural Problem, Joint Economic Committee, March 17, 1972; or Lester Thurow, Generating Inequality: Mechanisms of Distribution in the U.S. Economy (New York: Basic Books, 1975).

20. See, for example, Russell Rumberger, Overeducation in the U.S. Labor (New York: Praeger Publishers, 1981); V. Lane Rawlings and Lloyd Ulman, "The Utilization of College-Trained Manpower in the United States," in Margaret Gordon (ed.), Higher Education and the Labor Market, (New York: McGraw Hill, 1974); Ivan Berg, Education and Jobs: The Great Training Robbery, (New York: Praeger Publishers, 1970), Chapter 3.

21. The "entrepreneurial" model has been argued by Brint and Karabel, op. cit.

22. "Community Colleges and Industry Ally to Provide 'Customized' Job Training," Chronicle of Higher Education, October 27, 1982, p. 4; Brint and Karabel, op. cit.; Harris and Grede, op. cit., Chapter 11; W. Norton Grubb, Robert Glover, et. al., The Persistent Dilemmas of Preparing for Work: Occupational Training Programs in Texas (Austin: LBJ School of Public Affairs, 1983); Community and Junior College Journal, April, 1982.

23. For general evidence, see footnote 8 above. Community colleges have collected follow-up information through VEDS system, but such data is

collected in an inconsistent and haphazard fashion across the states (personnel communication, Robert Morgan). In Texas, the 1980-81 VEDS data indicates a total enrollment in the community colleges in vocational programs of 133,031, with 24,445 completers; however, the follow-up survey used a "universe" of 13,260, of whom 7,112 or 54% were of "status unknown." Thus, both because of non-response and because of sampling from completers rather than enrollees, the follow-up results are certain to be biased upwards.

24. Burton Clark, The Open-Door College (New York: McGraw-Hill, 1960); see also Karabel, op. cit.

25. Some evidence on class and racial background is presented in Breneman and Nelson, op. cit., pp. 100-102; The Condition of Vocational Education, Chapter 4.

26. Grubb, Glover, et al., op. cit., Chapter 2.

27. Pincus, op. cit., p. 343.

28. Harris and Grede, op. cit., pp. 89-96.

29. For some structural Marxist models, see Alan Wolfe, The Limits of Legitimacy: Political Contradictions of Contemporary Capitalism, (New York: The Free Press, 1970); James O'Connor, The Fiscal Crisis of the State, (New York: St. Martin's Press, 1973); W. Norton Grubb and Marvin Lazerson, Broken Promises: How Americans Fail Their Children, (New York: Basic Books, 1982), Chapters 5 and 10.

30. In O'Connor's vocabulary, education with vocational purposes is simultaneously a form of social investment benefitting capitalism and a form of social consumption benefitting workers. O'Connor, op. cit., pp. 111-117.

31. See, for example, Pincus, op. cit.; Karabel, op. cit.; W. Norton Grubb and Marvin Lazerson, "Rally 'Round the Workplace: Continuities and Fallacies in Career Education," Harvard Educational Review 45 (November 1975): 451-474.

32. The Condition of Vocational Education, Table 3.2. The way of reporting data has changed for subsequent years, so the division between those enrolled in A.A. and certificate programs and those in short-term programs is impossible to make.

33. National figures came from The Condition of Vocational Education, Table 10.1. Texas data are taken from Form FEDAC HR139 for 1980-81, available from the Texas Education Agency.

34. Grubb, Glover, et al., op. cit., Chapter 3.

35. Wilms and Hansell, op. cit.

36. This conclusion is more formally derived in a longer version of this paper available from the author. Job opportunities include both replacement of retiring workers and newly-created jobs; however, if the rate of replacement employment is a relatively constant fraction of employment in a specific occupation, the distinction between replacement jobs and new jobs can be ignored.

37. The classification of degrees uses the HEGIS codes developed by the U.S. Office of Education; see A Taxonomy of Instructional Programs in Higher Education, (U.S. Office of Education, 1970). There exists no well-developed cross-walk between HEGIS codes and U.S. Consus occupation codes, and so I have matched degree areas to occupations only in the areas where the matching is obvious.

38. The enrollment figures from the NCES Fall Enrollments in Higher Education series are generally not identified by program area, except for the 1978 figures where enrollments are identified by relatively aggregated areas like agriculture, biological sciences, and engineering, with the residual category by far the largest. Thus, it becomes necessary to use data on vocational education enrollments instead. The 1978-79 figures are taken from the VEDS system, published in The Condition of Vocational Education, Tables 3.3 and 3.4; the 1972-73 figures come from U.S. Office of Education, Bureau of Occupational and Adult Education, Summary Data Vocational Education, Fiscal Year 1973, Vocational Education Information No. 1 (Washington, D.C., 1975), pp. 9-14.

39. The enrollment data are classified according to Office of Education Instructional Codes; the occupational figures are classified according to 3 digit U.S. Census codes. A cross-walk between these two codes has just been prepared by the National Occupational Information Coordinating Committee. I have matched only the most obvious instructional programs and occupations, with no attempt to be comprehensive; a complete matching using the NOICC cross-walk would be much more time-consuming.

40. See, for example, Philip Kraft, Programming and Managers: The Routinization of Computer Programming in the United States (New York: Springer-Verlag, 1977).

41. As one example, see Bureau of Labor Statistics, Selected Characteristics of Persons in Fields of Science or Engineering: 1976, Current Population Reports, Series P-23, No. 76, October 1978, Table 3; this describes the highest degree, major field of study, and supplemental training for different areas of science and engineering.

42. Data on degrees is available for detailed areas (those shown in Table 1) for every year back into the 1960s, allowing analysis by program by year; in addition, data is available on the number of degrees by state, for every year, for aggregate programs areas -- data processing, health services, mechanical, natural science, business and commerce,

and public service (as well as for arts and science). Enrollment data is somewhat cruder and probably less reliable. In addition to the enrollment figures for detailed programs shown in Table 2, the VEDS data includes data on enrollment by states for the nine major programs areas -- agricultural, distribution, etc. -- for 1978-79 only. See The Condition of Vocational Education, Table 3.21